

Appellants' Brief on Appeal
U.S. Application Serial No. 10/642,615
Attorney Docket No. YOR920030023US1
(YOR.429)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of

Ali Afzali-Ardakani, et al.

Serial No.:	10/642,615	Group Art Unit:	1797
Filed:	August 19, 2003	Examiner:	Yelena G. Gakh
For:	MOLECULAR MANIPULATOR, A METHOD OF MAKING THE SAME, AND A METHOD OF MOVING A NANOSTRUCTURE		

APPELLANTS' BRIEF ON APPEAL

Honorable Commissioner of Patents
Alexandria, Virginia 22313-1450
Box AF

Sir:

Appellants respectfully appeal the final rejection of claims 1, 3, 4, 11-13, and 15-18 in the Final Office Action dated October 21, 2008. Appellants timely filed a Notice of Appeal and a Pre-Appeal Brief Request for Review on December 19, 2008.

A Notice of Panel Decision from Pre-Appeal Brief Review was issued on February 10, 2009 indicating that the application would proceed to the Board of Patent Appeals and Interferences.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corporation assignee of 100% interest of the above-referenced patent application.

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II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee, which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Appellants note that Appellants previously filed a Notice of Appeal and Pre-Appeal Brief Request for Review on May 24, 2007. Prosecution was reopened prior to proceeding to Appeal (see Notice of Panel Decision from Pre-Appeal Review dated June 20, 2007).

III. STATUS OF CLAIMS

Claims 1, 3, 4, 11-13, and 15-18 are all of the claims pending in the Application.

Appellants previously canceled claims 2, 5-10, 14, and 19-30.

Claims 1, 3, 4, 11-13, and 15-18, all of the claims involved in the appeal, are set forth fully in the attached Appendix.

Claims 1, 3, 4, 11-13, and 15-18 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

Claims 1, 3, 4, 11-13, and 15-18 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

IV. STATUS OF AMENDMENTS

Appellants filed a Request for Reconsideration under 37 C.F.R. § 1.111 on August 19, 2008. Appellants did not amend the claims in the Request for Reconsideration. The claims

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in the Appendix reflect the version of the claims in the Amendment under 37 C.F.R. § 1.116 submitted on February 19, 2008.

Appellants timely filed a Notice of Appeal on December 19, 2008.

Therefore, the claims are pending as set forth in the Appendix.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Appellants point out that reference numbers, figure numbers, and references to passages in the Specification used in this section, and other sections, of the Appeal Brief are provided merely for the benefit of the Board and for meeting the requirements set forth in 37 C.F.R. § 41.37(c)(v) and are not meant to limit the scope of the claimed invention in any manner.

INDEPENDENT CLAIM 1

The claimed invention, as set forth in exemplary claim 1, is directed to a molecular manipulator (e.g., 200; see Application at Figure 2, page 4, lines 9-14, and page 13, lines 18-23).

The molecular manipulator (e.g., 200) includes a light-sensitive compound (e.g., 100; see Application at Figures 1A, 1B, and 2, page 12, lines 4-11), and a probe (e.g., 230; see Application at Figure 2, page 13, lines 18-23) to which the light-sensitive molecule is attached. The light-sensitive compound (e.g., 100) includes two arms (e.g., 110; see Application at Figures 1A, 1B, and 2, page 12, lines 4-11), each of the two arms including an azo double bond (e.g., see Application at page 12, lines 4-11) and a central fragment (e.g., 130; see Application at Figures 1A, 1B, and 2, page 12, lines 4-11) of the light-sensitive

compound between the two arms, which includes a moiety, the moiety including a functional group selected from a group consisting of a sulfide, a thiol, and an isonitrile (e.g., see Application at page 12, lines 12-17). The light-sensitive compound changes a *cis-trans* configuration of the double bond in response to illumination by light of a selected wavelength (e.g., see Application at page 12, lines 18-22, page 13, lines 1-4, and page 14, lines 6-10).

The non-obvious and unique combination of features is capable of controllably grasping a selected nanostructure, controllably move the selected nanostructure, and controllably release the selected nanostructure at a predetermined position (e.g., see Application at page 4, lines 3-5).

Each of the features recited in dependent claims 3, 4, 11, 12, 13, and 15-18 are described in detail in the Specification (e.g., see pages 11-15) and Figures 1A-2 of the Application.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented for review by the Board of Patent Appeals and Interferences are whether the claimed invention of claims 1, 3, 4, 11-13, and 15-18 is enabled and whether the claimed invention of claims 1, 3, 4, 11-13, and 15-18 is definite.

VII. ARGUMENT

A. THE EXAMINER'S POSITION

In the Final Office Action dated October 21, 2008, the Examiner rejected claims 1, 3, 4, 11-13, and 15-18 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement rejection.

In the Office Action, the Examiner alleged, “[t]he claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.” (See Office Action dated October 21, 2008 at page 4).

Furthermore, in the Final Office Action dated October 21, 2008, the Examiner rejected claims 1, 3, 4, 11-13, and 15-18 under 35 U.S.C. § 112, second paragraph, as being indefinite.

In the Office Action, the Examiner alleged, “[i]t is not clear, what is meant by the term “molecular manipulator” in relation to the compound recited in the body of the claim.” (See Office Action dated October 21, 2008 at page 9).

B. APPELLANTS' POSITION

To summarize, Appellants submit that the Examiner's position is flawed as a matter of fact and law. Thus, claims 1, 3, 4, 11-13, and 15-18 are enabled and claims 1, 3, 4, 11-13, and 15-18 are definite.

- i) **Claims 1, 3, 4, 11-13, and 15-18 satisfy the enablement requirement of 35 U.S.C. §112, first paragraph.**

The Examiner alleges that the claimed invention of claims 1, 3, 4, 11-13, and 15-18 was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and use the invention. The Examiner, however, is clearly incorrect.

Appellants submit that the test for enablement is “whether that disclosure, when filed, contained sufficient information regarding the subject matter of the claims as to enable one skilled in the pertinent art to make and use the claimed invention”. More specifically, the claimed invention must be enabled “so that any person skilled in the art can make and use the invention without undue experimentation” (see M.P.E.P. § 2164.01; emphasis added by Applicants).

Appellants point out, as set forth in the M.P.E.P., that the test for enablement is not whether any experimentation is necessary, or whether the experimentation is complex, but whether the experimentation is undue (see M.P.E.P. § 2164.01).

Furthermore, Appellants point out that “[a]s long as the specification discloses at least one method for making and using the claimed invention that bears a reasonable correlation to the entire scope of the claim, then the enablement requirement of 35 U.S.C. 112 is satisfied” (see M.P.E.P. § 2164.01 (b); emphasis added by Appellants).

Appellants submit that the above standard for the enablement requirement has been met.

The Examiner's allegations center on the flawed reasoning that the specification allegedly does not include a detailed description of the synthesis of the light-sensitive molecules and allegedly does not include working examples of the light-sensitive molecules. The Examiner's application of the enablement requirement standard, however, is incorrect.

Appellants point out that the claimed invention is directed to a molecular manipulator, not a synthesis of the light-sensitive compound. Specifically, claim 1, for example, recites:

"A molecular manipulator, comprising:

a light-sensitive compound, said light-sensitive compound comprising:

two arms, each of said two arms comprising an azo double bond; and

a central fragment of said light-sensitive compound between said two

arms,

which comprises a moiety, said moiety comprising a functional group selected from a group consisting of a sulfide, a thiol, and an isonitrile,

wherein said light-sensitive compound changes a cis-trans configuration of the double bond in response to illumination by light of a selected wavelength; and

a probe to which the light-sensitive molecule is attached."

Therefore, the specification must merely disclose at least one method for making and using the molecular manipulator that bears a reasonable correlation to the scope of the claimed molecular manipulator.

Appellants submit that the specification (e.g., see specification at Figure 3 and page 14, lines 6-16) discloses at least one method for making and using the molecular manipulator that bears a reasonable correlation to the scope of the claimed molecular manipulator.

Additionally, the Examiner surprisingly alleges that the level of experimentation is undue. Appellants submit, however, that the level of experimentation required to make and use the claimed invention is not undue. Appellants submit that the synthesis of azo compounds is a commonly known practice. That is, those skilled in the art understand that azo compounds can be synthesized by using an azocoupling reaction (i.e., an electrophilic substitution reaction on aromatic rings with diazonium salts). Appellants are not required to include a detailed explanation of this known process in accordance with the M.P.E.P. guidelines that a “patent need not teach, and preferably omits, what is well known in the art” (see M.P.E.P. § 2164.01).

Moreover, the Examiner surprisingly alleges that Appellants have failed to provide proper working examples. Appellants point out, however, that “[c]ompliance with the enablement requirement of 35 U.S.C. 112, first paragraph, does not turn on whether an example is disclosed. An example may be ‘working’ or ‘prophetic’. A prophetic example describes an embodiment of the invention based on predicted results rather than work actually conducted or results actually achieved. An applicant need not have actually reduced the invention to practice prior to filing” (see M.P.E.P. § 2164.02; emphasis add by Applicants). Therefore, Appellants submit that the examples provided in Figures 1 and 2 of the Application are sufficient for purposes of providing an enabling disclosure of the claimed invention.

The Examiner's rejection relies mainly on the assertions that Appellants' disclosure is allegedly "hypothetical" and does not provide "examples" of the synthesis of the claimed molecular manipulator.

Breadth of the Claims

The Examiner continues to allege that the specification does not provide any guidance for the synthesis of the light sensitive molecules. The Examiner's analysis, however, is inconsistent with the breadth of the claimed invention.

That is, as pointed out above, the claimed invention is not directed to a method of synthesizing a light sensitive molecule. The claimed invention is directed to using a light sensitive molecule as a molecular manipulator (e.g., a tweezer; according to a non-limiting example illustrated in the specification).

The originally filed specification discloses, in detail, how the light sensitive molecule (illustrated in Figure 1A and 1B) is formed in a molecular manipulator (e.g., see Figures 2 and 3; see Application at page 13, line 18 through page 14, line 17) and how the molecular manipulator is used for moving a nanostructure (e.g., see Figure 4; see Application at page 14, line 18 through page 15, line 7).

Nature of the Invention

The Examiner again alleges, “the specification discloses unenabled utility of the fictitious molecules, with no guidance for the synthesis of the molecules.” (See Office Action dated April 30, 2008 at page 4).

Again, Appellants submit the claimed invention is not directed to a method of synthesizing a light sensitive molecule. Accordingly, it is not necessary for Appellants to provide a detailed explanation of the synthesis of the light sensitive molecule.

The State of the Prior Art

The Examiner alleges, “[n]one of recited papers indicate the possibility of using molecules recited in the claims and those depicted in Figures 1 and 2 as molecular manipulators; the examiner did not find any references, which would disclose a synthesis of similar compounds.” (See Office Action dated April 30, 2008 at page 6).

First, Appellants submit that, as described in the Background of the Invention and Summary of the Invention sections of the Application, the light sensitive molecules discussed in the Application have not been used conventionally in molecular manipulators. That is one of the novel features of the claimed invention.

Second, Appellants again submit that the documents submitted in the Information Disclosure Statement filed on August 19, 2003 illustrate the synthesis of similar light sensitive molecules.

Amount of Direction Provided By the Inventor

The Examiner alleges, “[t]he instant disclosure does not provide any direction for synthesis of the hypothetical structure disclosed in the specification. The instant disclosure does not provide any direction for application of these fictitious structures as molecular manipulators.” (See Office Action dated April 30, 2008).

Again, Appellants submit the claimed invention is not directed to a method of synthesizing a light sensitive molecule. Accordingly, it is not necessary for Appellants to provide a detailed explanation of the synthesis of the light sensitive molecule.

Furthermore, the originally filed specification discloses, in detail, how the light sensitive molecule (illustrated in Figure 1A and 1B) is formed in a molecular manipulator (e.g., see Figures 2 and 3; see Application at page 13, line 18 through page 14, line 17) and how the molecular manipulator is used for moving a nanostructure (e.g., see Figure 4; see Application at page 14, line 18 through page 15, line 7).

Existence of Working Examples

Appellants again point out that “[c]ompliance with the enablement requirement of 35 U.S.C. 112, first paragraph, does not turn on whether an example is disclosed. An example may be ‘working’ or ‘**prophetic**’. A prophetic example describes an embodiment of the invention based on predicted results rather than work actually conducted or results actually achieved. An applicant need not have actually reduced the invention to practice prior to filing” (see M.P.E.P. § 2164.02; emphasis add by Applicants). Therefore, Appellants submit

that the examples provided in Figures 1 and 2 of the Application are sufficient for purposes of providing an enabling disclosure of the claimed invention.

Moreover, Appellants submit that page 13 of the Specification provides a concrete example of the claimed invention.

Quantity of Experimentation Needed

With respect to the Examiner's allegations that the experimentation required by one of ordinary skill in the art would have been "undue", Appellants submit that "[t]ime and difficulty of experiments are not determinative if they are merely routine." (See M.P.E.P. § 2164.06; emphasis added by Applicants). Appellants submit that the experimentation required by one skilled in the related art to make and use the claimed invention is clearly routine (as is illustrated in the documents submitted in the Information Disclosure Statement filed on August 19, 2003).

Moreover, Appellants submit that since the level of skill in the related art is high, the degree of experimentation that is considered routines is also high. Appellants submit that the amount of experimentation required to make and use the claimed invention is commensurate with the level of skill in the related art.

Appellants maintain that since the claimed invention is not directed to a method of synthesizing a light sensitive molecule, it is not necessary for Appellants to provide a detailed explanation of the synthesis of the light sensitive molecule. Moreover, Appellants submit that the synthesis of such compounds is well-known in the art and the synthesis of such compounds is within the skill of one of ordinary skill in the art. Finally, Appellants submit

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that one of ordinary skill in the art, in view of the description provided in the originally filed specification and the knowledge commonly known to one of ordinary skill in the art would have been able to make and use the claimed molecular manipulator.

Finally, Appellants submit that when determining whether a claimed invention is enabled by the specification, the specification must be viewed through the eyes of one of ordinary skill in the art. In the Information Disclosure Statement filed on August 19, 2003, Appellants submitted several documents that illustrate the state of the invention and the level of one of ordinary skill in the art.

Appellants submitted a Declaration Under 37 C.F.R. §1.132 signed by a person of ordinary skill in the art attesting to Appellants position above.

Therefore, Appellants respectfully submit that the Examiners' position is clearly unreasonable.

ii) Claims 1, 3, 4, 11-13, and 15-18 satisfy the definiteness requirement of 35 U.S.C. §112, second paragraph.

The Examiner alleges that the claimed invention of claims 1, 3, 4, 11-13, and 15-18 is indefinite for allegedly failing to particularly point out and distinctly claim the subject matter of the claimed invention.

Specifically, the Examiner alleges that the term "molecular manipulator" is unclear. The Examiner, however, is clearly incorrect.

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That is, the Specification clearly defines the term "molecular manipulator" (e.g., see Application at page 11, lines 6-13). Furthermore, the specification explains how the molecular manipulator is formed by attaching the molecule to a probe (e.g., see Application at page 14, line 6 through page 15, line 7).

Therefore, Appellants respectfully submit that the Examiners' position is clearly unreasonable.

VIII. CONCLUSION

In view of the foregoing, Appellants submit that claims 1, 3, 4, 11-13, and 15-18, all of the claims presently pending in the application, are in condition for allowance. Thus, Appellants respectfully request the Board to remove the rejections of claims 1, 3, 4, 11-13, and 15-18.

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Please charge any deficiencies and/or credit any overpayments necessary to enter this paper to Assignee's Deposit Account number 50-510.

Respectfully Submitted,

Date: March 10, 2009



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CLAIMS APPENDIX

1. A molecular manipulator, comprising:
a light-sensitive compound, said light-sensitive compound comprising:
two arms, each of said two arms comprising an azo double bond; and
a central fragment of said light-sensitive compound between said two arms,
which comprises a moiety, said moiety comprising a functional group selected from a group
consisting of a sulfide, a thiol, and an isonitrile,
wherein said light-sensitive compound changes a *cis-trans*
configuration of the double bond in response to illumination by light of a selected
wavelength; and
a probe to which the light-sensitive molecule is attached.
3. The molecular manipulator of claim 1, wherein the probe comprises one of silicon,
silicon oxide, aluminum oxide, and titanium oxide.
4. The molecular manipulator of claim 1, wherein the light-sensitive compound is an azo
compound.
11. The molecular manipulator of claim 1, wherein each of the two arms includes a first
end, which is bonded to the moiety, and a second end, which includes a functional group, R.

12. The molecular manipulator of claim 11, wherein the functional group, R, is selected from the group consisting of an alkyl, a haloalkyl, an aryl, an alcohol, an ether, an amine, an aldehyde, a ketone, a carboxylic acid, an ester, and an amide.
13. The molecular manipulator of claim 1, wherein the functional group of the moiety covalently bonds to the probe.
15. The molecular manipulator of claim 13, wherein the probe is coated by a coating, to which the functional group of the moiety covalently bonds.
16. The molecular manipulator of claim 15, wherein the coating comprises a metal coating selected from the group consisting of gold, palladium, and platinum.
17. The molecular manipulator of claim 15, wherein the coating comprises one of trichlorosilane and trialkoxysilane, and the probe comprises a conductive metal oxide.
18. The molecular manipulator of claim 1, wherein each of the two arms comprises a different length.

EVIDENCE APPENDIX

- 1) 1. Copy of executed Declaration under 37 C.F.R. § 1.132 filed on August 19, 2008. Appellants submit that the Declaration was entered into the record on August 19, 2008 and was addressed by the Examiner in the Office Action dated October 21, 2008 (see page 2 of Office Action dated October 21, 2008, for example).

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RELATED PROCEEDINGS APPENDIX

Not applicable.

TRANSMITTAL OF APPEAL BRIEF (Large Entity)Docket No.
YOR920030023USIn Re Application Of: **Ali Afzali-Ardakani**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/642,615	August 19, 2003	Yelena G. Gakh	48150	1797	3761

Invention: **MOLECULAR MANIPULATOR, A METHOD OF MAKING THE SAME, AND A METHOD OF MOVING A NANOSTRUCTURE****COMMISSIONER FOR PATENTS:**Transmitted herewith is the Appeal Brief in this application, with respect to the Notice of Appeal filed on:
December 19, 2008The fee for filing this Appeal Brief is: **\$540.00**

- ☐ A check in the amount of the fee is enclosed.
- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **50-0510**. I have enclosed a duplicate copy of this sheet.
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WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.*Signature***Scott M. Tulino, Esq.**
Registration No. 48,317
Sean M. McGinn, Esq.
Registration No. 34,386Dated: **March 10, 2009**

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on

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